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SCIENCE NEWS-LETTER

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PIONEER PHYSIOLOGIST

His Modern Successors Commemorate His Work

(See page 90)

Vol. XVI *No. 436*

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Pioneer Physiologist Commemorated

Physiology

The fame of one American physiologist will be celebrated above all others as the members of the Thirteenth International Physiological Congress come together in Boston at the Harvard Medical School. The work of Dr. William Beaumont, U. S. Army surgeon, who was born in 1785 and died in 1853, was chosen for republication in a book to be presented to every member of the Congress.

It is the custom at each Congress to commemorate the work of one of the earliest physiologists of that country in which the Congress is meeting. And Dr. Beaumont is recognized as "the pioneer physiologist of the United States", remarkable for the scientific research which he carried on side by side with the arduous duties of a U. S. Army surgeon on the frontier.

The speech in which Sir William Osler set forth Beaumont's claims to this rank has been reprinted and bound together with a facsimile edition of Beaumont's great work on The Physiology of Digestion. It is this volume which is given to the incoming members.

The Congress which is meeting from August 18 to 23, at the Harvard Medical School in Boston, will hear hundreds of papers read on scores of physiological subjects, but none more remarkable for subject matter.

On the morning of June 6, 1822, at Fort Mackinac, Michigan, a young French-Canadian, Alexis St. Martin, was wounded by a shotgun accidently discharged into his abdomen. Doctor Beaumont, the surgeon of the fort, was sent for and extracted part of the shot together with pieces of clothing. After the operation he left, thinking that the patient could not possibly live.

He visited the patient again in two or three hours, and found him doing better than was to be expected. From that time forward the man progressed, but his progress was slow, and his recovery due almost entirely to the care and interest of Doctor Beaumont, not for a day or a week, but for years. Until 1825 the man was of little use to himself or to anyone else and the doctor supported him and his family and nursed him back to health.

The case began to develop aspects important for research when, in 1825, Dr. Beaumont realized that the man's side would not completely close. It was possible to enable the patient to lead a normal life, but there was no time when the doctor did not have an opportunity for immediate examination of the patient's digestive tract. This man, who proved to be a walking laboratory for the study of the physiology of digestion, was under observation by Dr. Beaumont for a number of years.

The experiments went on uninterruptedly from 1825 to 1831. Then St. Martin found it necessary to return to lower Canada, which he did by open canoe, "via the Mississippi, passing by St. Louis, ascended the Ohio river, then crossed the state of Ohio to the lakes, and descended the Erie and Ontario and the river St. Lawrence to Montreal." He took his family with him, including the two children born after the accident.

In November, 1832, he again engaged himself to submit to another series of experiments in Plattsburg and Washington. The last recorded experiment is in November, 1833.

This case is celebrated among physiologists all over the world. It is only recently, that is during the present century, that the work of Ivan Pavlov has verified and advanced many of the findings of Dr. Beaumont which had stood supreme until that time.

The work of Dr. Beaumont was notable for many reasons. It was one of the first observations of its kind, and enabled many theories to be confirmed, and many others which had been postulated without success to first-hand data to be exploded. It was notable for the accuracy and completeness of the descripiton of gastric juice itself. It confirmed the observation that the important acid as gastric juice was muriatic or hydrochloric.

It established by direct observation the profound influence of mental disturbances on the secretion of the gastric juice and on digestion. And it was the first comprehensive and thorough study of the motions of the stomach, observations on which are based the most of our present knowledge. Dr. Beaumont included in his study the very important work of determining the digestibility of different artcles of diet in the stomach, one of the most important contributions ever made to practical dietitics.

One of his observations, constantly referred to, is little heeded after the passage of all these years. He said: "The system requires much less than is generally supplied to it. If more be taken than the actual wants of the economy require, . . . the residue becomes a source of irritation and produced a consequent aberration of function. . . . Dyspepsia is oftener the effect of over-eating and over-drinking than of any other cause."

Beaumont served as an assistant surgeon during the War of 1812, and although he withdrew after the war he returned to service later, and was enabled to secure his greatest patient through his post at Fort Mackinac, located where the waters of Lake Michigan and Lake Huron unite.

His patient, Alexis St. Martin, lived to a good old age, dying in 1880, at the age of 76 at St. Thomas, near Montreal.

Science News-Letter, August 17, 1929

In This Issue—

Get ready for their *questions*, p. 91—Terrestrial *power* house, p. 94—Two *comets* in two days, p. 94—Valuable *"rubbish"*, p. 95—Germs by *Zeppelin*, p. 95—Flower eating *lizards*, p. 96—Does nature abhor a *vacuum?* p. 97—English *rainfall* predicted, p. 99—Geographic congress, p. 100—*Insane* behavior is significant, p. 101—*Gingko*, p. 102—New books, p. 103—Uses of *theory*, p. 104—Lady Hecate, p. 104.

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What Will the Census Ask You?

Demography

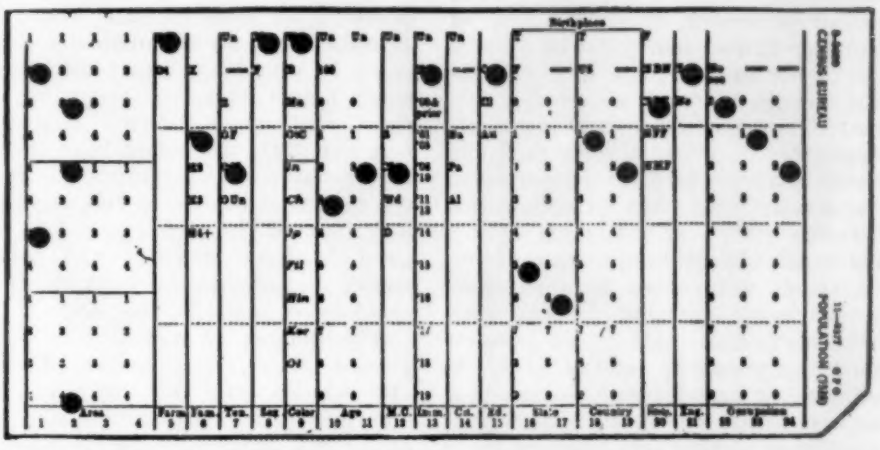
By Flora G. Orr

How old are you? Don't get angry with the poor man (or woman) who rings your doorbell soon after April 1, 1930, and who'll come in and sit on a stiff chair in your parlor and ask you all kinds of personal questions.

The much-abused census-taker can't help being inquisitive. The United States government has ordered him to ask you all about yourself and your family. Furthermore, the law reads that you must answer him correctly to the best of your ability, or be guilty of a misdemeanor against your Uncle Sam.

But you don't need to worry. The information you give the census-taker is strictly in confidence. After it gets to Washington you are given a number, that number is entered on a card, and the card is punched to indicate the information which you gave, and that card is used by the Census Bureau in compiling various masses of statistics, but the sheet containing your name goes into a file, to which nobody but the Census Bureau has access—not even another government bureau or department, such as the Treasury Department. Oh, some fifty years later, to be sure, the files are made available as public records, but fifty years is a long time—more than some lifetimes.

The census taker who comes to your house is just one of a field force of 100,000 doorbell ringers, who will have to hurry around and get the 1930 census in the districts assigned to them, and hurry the results in to Uncle Sam before the first of May, 1930.



WHEN YOUR ANSWERS get to Washington they are transferred in code to punch cards similar to this one. Each individual has his own numbered card which ingenious machines count.

It is believed, on the basis of estimates of average periodic increases in population, that the present census will list anywhere between 123,000,000 and 125,000,000 persons. There is an electric device on display at the Bureau of the Census which shows that in 1926 in the United States there was an average of:

One birth every 12 seconds.
One death every 24 seconds.
One immigrant every 1¾ minutes.
One emigrant every 5¾ minutes.
Net gain, one person every 20 seconds.

Today the Census Bureau says the pace has slowed up a bit, and our net gain now is one person every 23 seconds.

The last census, taken in 1910, showed that the United States, exclusive of possessions, had a population of 105,000,000. Figure it out for yourself. There have been many twenty-three second spaces of time since 1910.

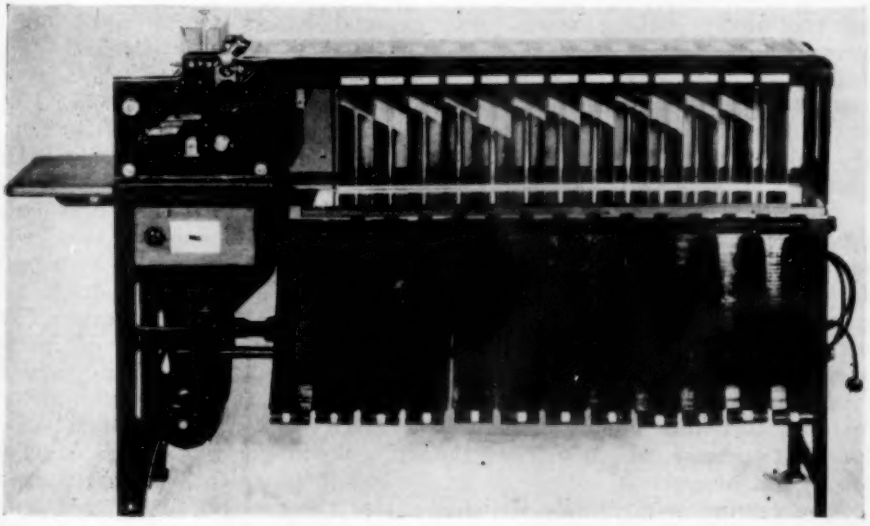
One hundred thousand enumerators out fishing with their nets of questions to ask you. What will the Census Bureau in Washington be doing to get ready for handling all the answers?

For one thing, the Census Bureau will be augmenting its force of clerks. About 5,400 to 7,500 extra population for Washington, D. C., may be in sight for the next one to three years. The clerical force at the Census Bureau must be increased from 600 to 6000 or 8000. Many of these temporary clerks, however, will be drawn from the present population of the District of Columbia.

The punch cards are being prepared, on which all the information about a resident of the United States is coded, and put in the card index system.

For the last census that meant 300,000,000 cards. To correlate facts thus transmitted to the cards, these cards then had to be run through the electrical tabulating machines, several times, so that it amounted to running two and one-half billion cards through the tabulating machines.

The regular questions to be asked this year about (*Turn to next page*)



ALMOST HUMAN INTELLIGENCE enables this machine not only to count the code cards at the rate of 100,000 in seven hours, but to sort them at the same time into 11 different groups, depending on their code perforation.

What Will the Census Ask You?—*Continued*

each person are as follows: His or her relationship to head of family; home owned or rented; if owned, free or mortgaged; does family live on a farm; sex; color or race; age at last birthday; single, married, widowed, or divorced; attended school any time since September 1, 1929; able to read and write; place of birth of person being enumerated, also place of birth of that person's father and mother; if not native of United States, year of immigration, naturalized or alien; does person being enumerated speak English; occupation, industry or business in which engaged; veteran of U. S. military or naval forces in any war or expedition, and if so, what war or expedition. The last question is a new one, added to the schedule this year by the Census Bureau.

By direct order of Congress, a census of unemployment is to be made, therefore enumerators have special instructions with regard to the occupation listing.

The Director of the Census, W. M. Steuart, states that it will be difficult to make the unemployment census absolutely accurate. There are many old persons, and some who are invalided, who would like to return to work, he states, but who should not be listed as having occupations and temporarily out of work. No occupation should be given for persons in this condition, he declares, no matter whether they are living off their own incomes or being supported by others. On the other hand, someone who is able to work and who has a trade or occupation normally may not be working when the census enumerator calls, and when he hears the question, "occupation", he may inadvertently answer "None", regardless of the fact that he usually has one, or is capable of having one if opportunity presents itself. It is exactly such persons as the latter type which the unemployment census should enumerate, therefore census-takers are being very carefully instructed to get the correct answers to this question.

But there are additional puzzlers for the pencil-pushing question boxes relative to this unemployment census. Here will be a married woman who works occasionally, or a man or a woman who is not particularly ambitious or under the necessity of working all the time, but who does take a job once in a while. How should the census enumerate these persons, if the enumerator finds them not on any job when he comes around?

If the census enumerator asked all the questions which it has been suggested from time to time would be desirable from an informational viewpoint, he would be around your home much longer than the space of the short visit which he will now pay you. In fact, you might have to ask him to have at least one meal with the family, if he had to take the time to gather all the sociological data desired in some quarters and which would undoubtedly be valuable if it could be obtained in this way.

The number of radio sets in the United States, the number of men and women over 65 years of age who possess less than $5000, religious affiliations, incomes, value of properties personally owned, racial descents, responses to literacy tests, number of rooms occupied by each family, extent of schooling, number of children per mother, ability of citizens to read English with understanding—are a few of the suggestions.

However, it is at present the aim of the Census Bureau to keep the schedule as simple and as compact as possible, and for the present at least, not to try to expend too much in connection with the population census.

"We are holding down the scope of the inquiry," states Dr. Joseph A. Hill, assistant director of the Census Bureau, "for two reasons. First, we are already collecting about as much information as we are able properly to tabulate and use at the present time, with the facilities at our command. Second, we constantly conduct other censuses by correspondence with various state and county agencies, and we are continually making special censuses with our regular permanent field staff of enumerators. We made a complete census of religious bodies in the United States in 1926, results of which have just recently been tabulated. Every two years we make a census of manufactures, including a canvass of factories or plants. We keep up to date our figures regarding the output of the previous year, the number of employees in each industry, aggregate sum paid out in wages, cost of material consumed, and horsepower used. In the current census of manufactures, there are interesting figures for that newest of industries—the production of aircraft.

"We continuously compile statistics of births and deaths, getting our data from state or local health offices. All but four states are now included in the birth-registration area. Inclusion in this area means that a state has a birth registration law conforming to one drafted by the Bureau of the Census, the American Medical Association, and the American Public Health Association."

Financial statistics of states and cities are either obtained by correspondence or by special agents who spend anywhere from 6 to 100 days on the ground, going over records and reports and consulting officials. Statistics on marriage and divorce are compiled each year, from reports sent in by county and state officials.

It is undoubtedly true that in future years some method will be found whereby the Census Bureau's statistical work will expand to furnish the answers to questions constantly being asked in connection with immigration, law enforcement, public health, and a score of other subjects on which definite information is lacking. Whether such censuses will be undertaken directly in connection with the enumeration of the population it is impossible to state at this time.

There have been attempts in the past to have the population enumerators get crime statistics. This was one of the duties of the census-takers in 1890. They got their information from county and district courthouses. In 1880 questions on individual health were part of the schedule. Long ago, it was part of the enumerator's duties to furnish the names of all the deaf, dumb, and blind. Even today, each enumerator carries some special blanks on which he is to write the names of deaf-mutes and blind persons, and these persons are later sent special blanks to be filled out by themselves or their families. Most public health statistics are today collected by the Bureau of Public Health rather than by the Census Bureau.

From time to time, framers of immigration laws have thought that information could be collected along with each decennial census which would help in making up immigration laws. One suggested inquiry along this line was that each person should be asked the nationality of his parents. Another question suggested was: "What was your mother's maiden name?" But patent difficulties lie in the way of obtaining any exact information about racial descent from the answers to be made to these questions.

"Nationality" is a broad term. A native of Alsace-Lorraine might be either German or (*Turn to next page*)

What Will the Census Ask You?—*Continued*

French. A Canadian may be Scotch-Irish, English, French-English, or any one of a number of other bloods or combinations of bloods. Hundreds of thousands of Americans have no idea at all what their mother's maiden names were. Furthermore, knowing the names of parents gives but inaccurate information as to racial descent, as it is a common practice in this country to corrupt and change family names. A person who is one-eighth negro blood may have had parents both of whose names were pure English in sound and spelling.

The "mother tongue" question asked in former population censuses relative to parents also did not work out to give any very valuable statistical information.

The Director of the Census has finally decided that if it can be learned in what country each of the parents of an individual was born, that is as much detail as we can ever expect to get with regard to racial descent.

An agricultural census is taken every two years, therefore the present one will be taken along with the regular census. In the Bureau of the Census, 15 or 20 punch cards will be required to carry the data for each farm. About 100,000,000 cards are being prepared for the agricultural census alone. In the agricultural census of 1925, 6,371,640 farms were enumerated.

Business demands will have their way this year, in that a complete census of distribution, and the way Americans spend their money for commodities is to be made. Such a study was made in 1926 in a few large cities. Complete inventories of retail establishments, volume of retail sales by all kinds of businesses, sales per capital, number of inhabitants per store, employes in retail distribution, their salaries and the relation of their salaries to sales—and the same subjects of inquiry relative to the wholesale establishments are to be made. Excepting in country districts, this census will not be made by the population enumerators, but by special enumerators appointed by the Census Bureau. Though American business is legitimately curious as to an analysis of where and how citizens of the United States spend the eighty billion dollars they are said to use every year for the purchase of commodities, nevertheless, Director Steuart foresees difficulties. In a recent statement he declared:

"Furniture made by a Grand Rapids manufacturing plant may be sold through a wholesale mart in Chicago and move to its user without touching that city. Copper mined in Arizona may move through San Francisco to delivery to a new owner at Baltimore, while the sale is actually made in a New York office. Where shall we say the business transpired? Transaction on the Chicago Board of Trade may touch the disposition of wheat that never moves out of Minneapolis. Duplications in this census are going to be hard to avoid, and the production of worthwhile statistics on distribution is going to be a hard task."

The first census of the United States was little more than a count of the number of inhabitants in 1790. It was undertaken largely for the purpose of determining congressional representation, and the distribution of taxes. United States marshals were the census supervisors.

The name of the head of each family was written down in a record book supplied by the marshal himself, and opposite the name he wrote the number of free white males in the family under 16 years of age, and those over 16 years of age, also the number of free white females in that family, the number of free colored persons in the household, and lastly the number of slaves.

These columns were added up by hand and the totals were sent to the office of the Secretary of State in Philadelphia, where the hand-adding was continued, in order to get the totals for each political division and for the whole United States.

By 1800 more details of ages and sex were included; and in 1840 the government printed the schedules to be used, and asked for still further details of ages of males, females, and free colored inhabitants. The number of persons in each family employed in the various trades was requested; the headings of the trades listed were mining, agriculture, commerce, manufacturing and trading; navigation of the ocean; navigation of lakes, canals and rivers; the learned professions and engineering. The number of pensioners on account of military service in each family was asked, also the ages of such pensioners; and the number of deaf, dumb, blind and insane. By 1850, each free person, black or white, male or female—had a whole line to himself or herself in the census schedule, and the occupation of each male over 15 was given.

More tabulation than ever before is to be undertaken by the Census Bureau in connection with the 1930 census. There will be more detailed tables as to ages. These will be listed by 5's up to the age of 25, and by 10's from 25 up to 75 years of age. More details as to marital status of residents of the United States will be tabulated.

Are you one who will have no difficulty answering the question: How old are you? It would be interesting to know how many persons out of the approximate 125,000,000 about whom statistics are to be gathered, do not themselves know exactly how old they are. A great many persons, it is evident, says Leon E. Truesdell, chief statistician for population in the Census Bureau, are uncertain on this point, and have no way of getting any correct information about it. The statistics on age as they come in this time are expected to show, as always, he says, that there is a tendency for men and women to approximate their ages, so that there is a strong concentration on the even numbers such as 32, 36, 42, etc., rather than much mention of such ages as 31, 37, 39 or 41, and a still greater approximation and concentration on the "fives" and the "tens". Men of 37 or 38 years are apt to say they are 35 or 40, respectively. Women of 27, 28 and 29 tend to approximate themselves as "around 25".

Something to astonish the world has been the growth of the population of the United States since 1790! It will be in 1930 more than 30 times as great as in 1790, and nearly twice what it was in 1890.

If the present rate of increase should go on indefinitely, statisticians estimate that in 1970 there would be 200,000,000 persons in continental United States. However, the present rate of growth is not expected to continue indefinitely. The birth rate is declining. Immigration is being held down, and further restrictions may be imposed in future years.

Nevertheless, 130,000,000 or even 140,000,000 is no idle mark to shoot at. We will get there all right, and probably sooner than we think. It is believed that by 1950, with all factors taken into consideration, we may actually have a population of 150,000,000. And 187,000,000 by the year 2000 is foreseen.

Science News-Letter, August 17, 1929

Earth Yields 200,000,000 Amperes

Physics

The earth itself is a huge electric dynamo generating enough current to supply light, heat and other electrical needs to the ten largest cities in the United States for at least one million years. Recent researches on thermal reactions inside the earth, conducted by Dr. Ross Gunn, civilian scientist of the Naval Research Laboratories, and inventor of a short wave oscillator and airplane altimeter that have been taken up by the radio and aircraft industries, indicate that the earth is the greatest known electrical wonder in the universe.

Dr. Gunn has published a theoretical treatise on his studies in the *Physical Review*. The intricate theoretical problem of the earth's electrical condition showed that the currents generated inside the earth amount to more than 200,000,000 amperes. Dr. Gunn is careful to emphasize that this tremendous source of energy is unavailable for use by man. Like atomic energy, it will be kept in Nature's storehouse for the use of the generations of perhaps a million years in the future, he says.

According to Dr. Gunn, the tremendous electrical currents that are produced inside the earth arise from the motions of the tiny electrical charges known as electrons. The motions are caused by the very high temperatures existing well inside the earth's crust.

Due to a peculiar and complicated type of interaction the electrons are caused to drift around the earth's axis of rotation. This drift of electrons constitutes an electric current which is so large that, if it were sent through the huge cables, supporting Brooklyn Bridge, it would melt them in less than a thousandth of a second.

The presence of the currents that flow in the hot interior of the earth may be detected by anyone who cares to observe the action of a magnetic compass on the surface of the earth, says Dr. Gunn, for it is precisely these deep-seated electric currents that orient the compass needle in a north-south direction. He adds that it has been known for thousands of years that the earth behaved like a giant magnet, but the mechanism by which this magnetism was produced was not understood.

The study pursued by Dr. Gunn sheds much light on the manner in which the earth was originally formed. His work and known facts relating to the earth's magnetic field indicate that the earth was part of the sun or some other liquid star millions of years ago. When the earth was thrown off the sun, it came off in such a manner that the hemisphere now embraced by the continents was made up of relatively cool surface material having a mean temperature of perhaps 50,000 degrees while the hemisphere embraced by the Pacific Ocean came from deeper and much hotter layers.

This unsymmetrical temperature distribution of the earth's interior is said to account for the volcanic activity and earthquakes in the countries in and adjacent to the Pacific Ocean.

Science News-Letter, August 17, 1929

Two Comets on Successive Days

Astronomy

Two new comets on two successive days is August's gift to the astronomical world. On August 1, David Lamont Forbes, an amateur astronomer of Rondebosch, South Africa, found one in the constellation of Sagittarius, according to an announcement by Dr. Harlow Shapley, director of the Harvard College Observatory. The following day Dr. G. Neujmin, a Russian astronomer at the Simeis Observatory in the Crimea, discovered another not far away, in the constellation of Aquarius. The Russian discovery became generally known several days before news of the one in South Africa was circulated, however.

When observed on the evening of August 3, Forbes' Comet was at the position 20 hours and 52 seconds right ascension and 30 degrees 26 minutes south declination. This is in Sagittarius, a star group that is directly south in August evenings. Sagittarius contains no very bright stars, but is characterized by five stars forming the "little milk dipper". This dipper has four stars outlining the bowl and one to the west at the end of the handle. The dipper is inverted and the brightest star of the constellation is in its uppermost part. The comet, on August 3, was to the east of this milk dipper, and distant from it a little more than its length. Though Dr. Shapley has not been advised of its brightness, the comet is presumably too faint to be seen without a large telescope. It is moving to the northwest, and if it becomes brighter, it may come into naked-eye view.

When Dr. Neujmin found his comet on the evening of Friday, August 2, it was in the constellation of Aquarius. Its apparent place was 21 hours, 16 minutes, 4.6 seconds right ascension and 12 degrees, 45 minutes, 41 seconds south declination. Aquarius is a constellation that can now be seen in the southeastern evening sky. About midnight it is directly south and about 40 degrees above the horizon. A curious feature of the discovery is that the comet was very close to the ecliptic, the path in which the planets move, and it had a planetary motion, according to the discoverer.

In accordance with custom, the new comets will be named after the discoverers. Dr. Neujmin is no stranger to this honor, for in 1914 he discovered a periodic comet which bears his name. In 1914 he discovered another, not periodic; then he found another periodic one in 1916. When it returned in 1926 he first located it. Until the orbit of the new comet is calculated, it cannot be told whether it is periodic or not, or whether it will become bright enough to be visible without a telescope. It is now of the 13th magnitude, much too faint to be seen except with a large telescope. Mr. Forbes discovered his first comet last year.

The past two years have been rather sparse in comet discoveries, which is especially marked, because seven were found in 1926 and ten in 1927. Six of the discoveries in the latter year were of new comets, while four were of old friends on return visits. In 1928 three comets, all new, were discovered. All of the comets in 1929—the two new ones and one discovered in January by two German astronomers named Schwassmann and Wachmann—were previously unknown. Just why there should be such a difference in the number of discoveries is uncertain, but it probably means that astronomers are not watching for comets as closely as they were in 1927.

Science News-Letter, August 17, 1929

A shark weighing 200 pounds has a liver weighing 20 or even 30 pounds.

Isaac Newton's Library for Sale

Bibliography

By James Stokley

The library of Sir Isaac Newton, greatest of English-speaking scientists, is now for sale in London, and British men of science are wondering what its ultimate fate may be. Will it cross the Atlantic to the United States, as so many of England's literary treasures have done in recent years, or will it find an appropriate resting place in the Royal Society's library or at Newton's *alma mater*, Trinity College, Cambridge? Though no definite price has been set so far, it is not likely that the books will be sold for less than $100,000. The present owner will only sell the library as a complete unit, so there is no danger of it being scattered.

Until the recent discovery of these books by Col. R. de Villamil, the whereabouts of Newton's library was a mystery of many years' standing. Because of his outstanding eminence in the late seventeenth and early eighteenth centuries, it was obvious that Newton must have had a large library, but none of the biographies mentioned it. Until 1920 it was thought that the library had completely vanished.

In that year an old mansion at Thame Park, in Oxfordshire, was sold at auction by the owner, a Mr. Wykeham-Musgrave, who owned another home at Barnsley Park, in Gloucestershire. To this sale were sent a lot of old books from the latter house. The books were not known to be of any particular value, and were sold as rubbish, even though a few bore the autograph "Js. Newton". The entire lot went for about $500. A few of the purchasers discovered that they had books from Newton's library; these were eventually sold in London by a large dealer in old scientific works, but a considerable number of the books were sent to the pulp mill and irretrievably lost. Of those sold, many were bought for American libraries. Many brought prices as high as several hundred dollars, and one, the copy of Euclid that Newton used as a student at Cambridge, was listed at $3,000.

In 1927, at the time of the tercentenary of Newton's death, Col. de Villamil wrote an account of "The Tragedy of Sir Isaac Newton's Library" in *The Bookman*. This came to the attention of Mr. Wykeham-Musgrave, who finally invited Col. de Villamil to visit his Barnsley Park home to see a few books that still remained. He had previously discovered a catalog of the library, made about 1760, showing that it had contained 1,896 books.

"I went," he said, "expecting to see, probably, 15 or 20 books, but found I could count at least 300 or 400, and I guessed there might be 600. I have catalogued them, and have actually found 860, which, out of 1,896, is more than what one would call a residue."

All these books had been stuck away in cupboards and corners where their owner did not even know of their existence, otherwise they would probably have been sold at Thame Park and lost.

Col. de Villamil has now worked out the complete history of the library. After Newton's death it was sold to his neighbor, John Huggins, warden of the Fleet Prison. He gave the books to his son, Charles Huggins, rector of Chinnor. When he died, about 1750, his successor, Dr. James Musgrave, bought it from the estate for 400 pounds, and pasted his own bookplate in the books, over the Huggins bookplate. The Musgrave plate consisted of his arms combined with the Huggins arms, for he had married Charles Huggins' niece. Underneath was the Latin motto, "Philosophemur". This bookplate is still in the books, together with the numbers Dr. Musgrave put in them when he catalogued the library, about 1760. It is this catalog that Col. de Villamil found.

Dr. Musgrave died in 1778, and the library passed to his son, who took it to Barnsley Park. There is was recatalogued and renumbered. Though the original owner was then recognized, the Newton tradition was finally forgotten, and they were stuck away as old books of no particular value. There they remained until discovered by Col de Villamil.

Science News-Letter, August 17, 1929

Plenty of Potash

Chemistry

The survey now being conducted by the United States Bureau of Mines and the U. S. Geological Survey has disclosed the fact that we have in the Permian basin a sufficient reserve of potash to make the nation independent in any future emergency such as that which arose in 1910, when German legislation voided all American potash contracts. It will be necessary to solve certain problems of transportation, marketing, and mining engineering before the potash is available for commercial use, but these problems are now being attacked by federal, state, and private agencies.

The area in which the potash-bearing salts have been found occupies about 22 counties in Texas and New Mexico. Altogether it covers about 40,000 square miles.

Science News-Letter, August 17, 1929

Zeppelin Brought Cancer Culture

Medicine

The Graf Zeppelin on its speedy trip from Germany brought to the Cancer Research Laboratory of the University of Pennsylvania cultures of cancer cells of a special rat sarcoma type that would not have survived the long steamer voyage across the Atlantic.

"The cultures must be transplanted every few days and the Graf Zeppelin offered a quick method of transportation so that they may be transplanted on their arrival here," explained Dr. Ellice McDonald, director of the Cancer Research Laboratory of the University of Pennsylvania's Graduate School of Medicine, to whom the valuable cancer cultures were consigned. "It is almost impossible to carry the necessary laboratory apparatus to make these transplantations on board a steamship."

The growing cancer cells came from the Kaiser Wilhelm Institute für Biologie in Berlin through arrangements made by Dr. Raymond Parker of Dr. McDonald's staff and Prof. William Seifriz of the University of Pennsylvania. Dr. Parker has been studying this year with Prof. Albert Fischer of the Berlin institution.

Although not the same kind of cancer that affects human beings, the rat strain when safely established in its new American home will prove useful in the laboratory's study of mitosis or cell division. It is also expected that the cancer cultures will throw new light upon the possibility of the modification of the rate of growth or cell division by various chemicals and it is possible that such experiments may prove to be the starting point of new knowledge of the human disease.

Science News-Letter, August 17, 1929

2 *Particularly Attractive New Items*

RESEARCH NARRATIVES

Volume III

The third series of fifty-five minute stories of invention, discovery and scientific research. Thousands of copies of the first two series have been purchased. (The first volume is out of print). The third volume is fully up to the other two in interest. The NARRATIVES are compiled by ALFRED FLINN of Engineering Foundation. Published August 3. $1.00.

THE CHILD'S HEREDITY

Offered at an unusually attractive figure because this is a book which will have large distribution. It is described by the author, PAUL POPENOE, as a Guide Book for Parents. It tells in very plain language all that is known about heredity, physical, mental, constitutional and temperamental. It discusses a multitude of matters including "prenatal influence," sex determination, inheritance of acquired characters, divergencies within the family, origin of new traits. 304 pages. Amply illustrated. Selected bibliography. $2.00.

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BALTIMORE, U. S. A.

Lizard Feeds on Flowers

Zoology

It is not always the loveliest creature that feeds on the daintiest diet. The chuckwalla lizard of the Southwest, the second largest lizard in the United States, is not exactly a Ziegfield beauty among the animals, yet his choice appetite runs very strongly to flowers. A specimen recently in its stomach 118 flower-reads had in its stomach 118 flower-heads of three species of composite plants, and three flowers of the yellow bean bush. These represented the breakfast of the chuckwalla. In his second stomach—the fortunate reptile has two—was another mass of flower tissue, but more advanced in digestion.

The chuckwalla has for years been a favorite dish among the Indians, and many a lost prospector has overcome the white man's repugnance to eating "varmints", to find with surprise that this big lizard is made of good meat. After the recently captured specimen had yielded up its skin for museum purposes, its flesh was roasted, and eight persons had a chance to find out what chuckwalla meat tastes like.

Science News-Letter, August 17, 1929

Helium Atoms on Radio

Physics

A sound like hail pattering against a window pane was heard from the loud speakers of millions of radio sets throughout the country on Saturday evening, August 10. It was not static, but the sound of helium atoms leaving the radioactive metal uranium, and bombarding a small piece of metal. The experiment took place in a room of the General Electric Company's research laboratory and was broadcast over a nation-wide chain of 41 radio stations.

The apparatus used for the experiment is known as a Geiger counter, and was described by A. L. Hawkins, executive engineer of the Research Laboratory. The piece of uranium is no larger than a five-cent piece and the atoms leave it faster than the fire of a machine gun. Yet they are so small that more than a million million can rest on the head of a pin, and not until five thousand million years have elapsed would half of the uranium be used up.

Science News-Letter, August 17, 1929

The economic loss from automobile accidents in the United States is estimated at $800,000,000 a year.

Chinese apartment houses have the storage rooms and laundries on the roof instead of in the basement.

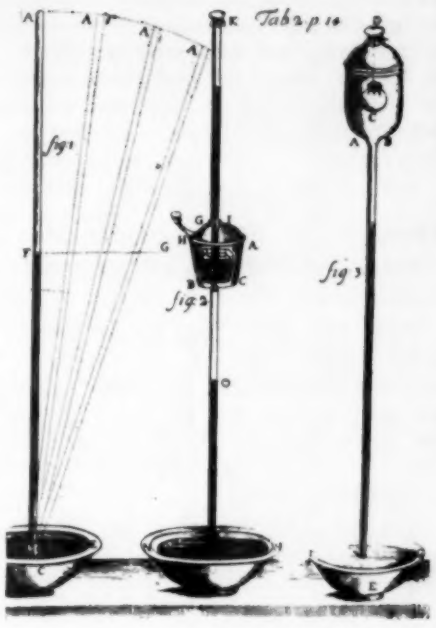
CLASSIC INVENTIONS: Torricelli's Vacuum

Physics

This is Torricelli's famous experiment, the first demonstration that Nature's abhorrence of a vacuum" is limited, and the elaboration of the experiment by Torricelli's pupils.

ESSAYES OF NATURAL EXPERIMENTS Made in the Academie del Cimento, Under the Protection of the Most Serene Prince Leopold of Tuscany. Written in Italian by the Secretary of that Academy. Englished by Richard Waller, Fellow of the Royal Society. London, Printed for Benjamin Alsop at the Angel *and* Bible *in the* Poultrey, *over-against the* Church. 1684.

An Experiment, *Suggesting to* Torricelli *the first* Inventor *thereof, that it might be the natural external* Pressure of the Air *which sustains the* Mercury, *or any other* Fluid, *at a determinate Height in the* empty *space of a Cane,* &c.



TAB. 2

Provide a glass Cane about 46 Inches long, *Heremetically* sealed at one end, and open at the other, represented by A B C. Fill this with *Mercury*, and stop the mouth C close, either with your Finger, or a moistened Bladder tyed over it; invert it, and gently immerse it into the Vessel of Stagnant Quick-silver D E then untie the mouth C and immediately the *Mercury* in the Cane will subside for the whole space AF where meeting with its Level, or Counterpoise after some Fluctuations, it rests immovable: and the Cilinder of Quick-silver sustained E B which bears upon the superficies of the Stagnant *Mercury* D E shall be about the length of 28-6/10 Inches, which length is found to vary, though but little, from External Accidents of *Heat* and *Cold;* and something more from the divers seasons of the *Air*, as appears plainly from a long Series of our Observations. Nevertheless, these variations being very little, it will be always about the before-mentioned Height of 28-6/10 Inches, or near it.

The space A F shall contain no *Air*, which is manifest by inclining the Cane about the Point C as a *Center*, when you will find the internal Level F successively move towards A, but never rise above the *horizontal* prickt line F G, drawn from the point F, the first height of the *Quick-silver*, when the Cane was *perpendicular;* and if the end A be inclined quite to the line F G, the Cane will be full of *Quick-silver*, except a very little at A, whither still above the level of the included *Mercury*, gathers together either some *air* wherewith perhaps it is impregnated, or some other invisible *affluvia* exhaling there from. This is most conspicuous, when a small quantity of Water is in the Cane, which in making the *Vacuum* gets above the *Mercury*, and discovers in their passage through the midst of it, that several small Bubbles rise out of the *Mercury* towards the empty space; as may be shewn hereafter.

This Vacuity of *Air* may likewise be proved by *Water* poured upon the *Quick-silver* in the Vessel D E, for lifting the Mouth of the Cane C out of the *Quick-silver*, as soon as it is every way encompassed with the *Water*, the *Mercury* will fall down, raising the *Water* in its place to the top of the Cane; provided it exceeds not the length of 33 Feet 25 Inches, to which (as may be elsewhere discoursed) it is usual for *Water* to be sustained; probably from the same power that bears up the *Mercury* to 28-6/10 Inches; and indeed, there will be no great quantity of *Air* at the top of the Cane; since there is onely some thin *Effluvia* forced into an almost invisible space, which (as we said) rise from the *Quick-silver*, or is some other subtil Matter capable of penetrating thither.

Upon this ground we shall call (as before for brevity sake) the space A F, (and any other left by the subsiding *Mercury* in a like Vessel) the *vacuum*, or *void space*, (*i. e*) empty, and void of *Air;* at least such as unaltered, and in its Natural State encompasses the Cane; not presuming here to exclude *Fire*, *Light*, or the *Ether*, or any other very thin Bodies, which are either in part dispersed with little *vacuities* interposed, or wholly filled the space, which we call the *vacuum*, being stretcht and attenuated as some think. Nevertheless, 'tis our intent in this place, onely to discourse of the Space fill'd with *Mercury*, and endeavor to find the true cause of that wonderful Counterpoise of this Weight, without entering into any Dispute with the deniers of a *Vacuity*. And since many Experiments have been made for this end, (as well what is related by others, as what has been invented by our *Academy*) the success shall be faithfully set down; our Custome being always to deliver the Matter *Historically*, and not to defraud the *Inventors* either of their Invention, or due *praise*.

An Experiment *Of Mr.* Robervals *in favour of the* Airs Pressure *upon Inferior Bodies, tryed in our* Academy.

Let there be a glass Vessel A, to the bottom of which B C perforated at D; let the Cane D E 46 Inches long be affixt, over this hols set the square glass F, then close the Vessel A with the glass Cover G H, having an open nose H I, and a hole at G, through which let the Cane K I be put open at each end, and about 46 inches long, or not less then 30; let this down into the Glass F, but not quite to touch the bottom; and fasten it there with Mastic, or other Cement at the fire, to the hole in the Cover G; this Cement, or Paste, is made of Brick reduced to an impalbable Powder, and incorporated with Turpentine, and Greek Pitch; 'tis admirable to stop Glasses to exclude the *Air;* let it be luted close with the same, round about where the said Cover and Vessel joyn; and cover the lower mouth E with a Bladder; Then pour in at the upper end K so much *Mercury*, till running over the Glass F it falls upon the bottom B C, and thence by the hole D fills the lower Cane E D, and after that the whole Vessel A, the *Air* having its way out by the open Nose H I, which when the *Mercury* be- (*Turn to next page*)

Torricelli's Vacuum—*Continued*

gins to run through it, close well with the Bladder I, and lift up the whole Cane to K till a little runs over, that not the least *Air* may remain when closed, which do with the Bladder K. Lastly, open the other Bladder at the Mouth E under the Superficies of the Stagnant *Mercury* M N, into which the Cane is immersed, an dimmediately the upper Cane K L, and the Vessel A will empty themselves; the Glass F and O P, part of the Cane D E being about 28½ Inches above the Level, M N remaining full. This done, the ingress of the External *Air* upon opening, or pricking the Bladder I, will immediately suppress the *Cilinder* of *Mercury* O P into the lower Vessel, and raise up another Q R from the *Mercury* in the glass Cup F into the Cane L K equal to the former O P, and therefore 28½ Inches long; and this *Cilinder* will not subside until the External *Air* entering at the top K, rushes in upon it through the Cane L K.

If in this Vessel A, a little Bladder be enclosed, taken carefully out of a *Fish*, the *Air* that is Naturally therein being first expressed, so as very little be left in the folds thereof, and then the Orifice well tyed together, as soon as ever (by the subsiding of the *Mercury*) the Bladder shall be in *vacuo*, that little *Air* remaining in it will swell, and distend it; nor will it shrink again, till by opening the Vessel at K the External *Air* gets in to press upon it.

But we have observed more clearly the like Expansion of *Air in vacuo*, in a Vessel made after another manner, as A D B, wherein a Lambs Bladder squeezed together, and almost wholly discharged of *Air*, is inclosed thus; fill the Vessel with *Quicksilver* by the mouth D, and tye it over with a Bladder, the lower Mouth E being before stopt with the Finger, then immersing it into the *Quicksilver*, in the Vessel F G, open the Mouth E, and let the *Quick-silver* subside; then will the Bladder C hung by a Thread in the empty Vessel A D B swell it self, and so continue, till by opening the Mouth D, the External *Air* enters at the Top, which at the same time will bear down the *Cilinder* of *Mercury* into the Vessel at the bottom F G, and press together the Bladder.

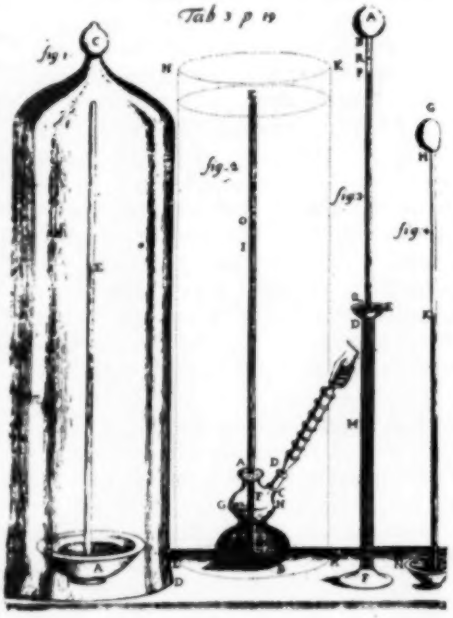
Likewise, if in closing the Mouth D, there be put upon the *Mercury* a little froth made with *whites* of *Eggs*, or *Soap-suds*, still as the Vessel A D B empties it self, the *Air* imprisoned in these small *bubbles* will so swell them, that at length breaking through its thin Confinements, it shall be at liberty, and quite released from the Liquor, which will fall down upon the *Mercury* like Dew separated from that fine streame of *Air* contained in the *froth*.

Experiments *Alledged by some against the* Pressure of the Air, *and the Answer thereto.*

There have been Two Experiments, from which some of our *Academy* judged a considerable *Argument* might be raised against the *Pressure of the Air* upon Inferior Bodies, and the Effect of sustaining Fluids attributed to something else.

One was, by covering the Vessel A, and likewise the Cane with a great *Bell* of Glass B C D pasted down close to a Table round the edges: for then they imagine, that if it were true, that the weight of the whole incumbent *Atmosphere of Air* did protrude the *Mercury* into the Cane, and counterpoise it with its weight; by defending (with this Cover of Glass) the Stagnant *Mercury* from so great a *Pressure*, the small, and scarce sensible weight of the little portion of *Air* included within the Bell, must of necessity be unable to keep the *Quicksilver* at the same height whereto the *momentum* of so vast a space of *Air* had raised it; but notwithstanding this, they never observed it to subside a jot from the usual height E G.

The Second *Experiment* was of the same Nature, but more Artificial.



TAB. 3

We fill'd with *Mercury* a small Vessel A B (which at first was made without the Beak C D, added afterwards for another Experiment) and plunged into it when full, the Cane E F, and making the usual *Vacuum*, there was poured out from the Vessel A B a small quantity of *Quick-silver*, so that a little *Air* might be in the space A H to bear upon the *Stagnant* Level H G, and then the Weight and *Pressure* of the External *Air* was kept off, by closing carefully with the afore-named Cement, the round space A between the Neck of the Vessel, and the Cane; and yet in this case, when the bulk of the External *Air* was so lessened to nothing almost, we saw no sensible abatement of the *Mercurial Cilinder* I F below the usual height.

But the Assertors of the *Airs Pressure* answer these Experiments thus. That these Events on the contrary greatly favour their *Opinion;* for the immediate cause (as they say) that forces, and powerfully sustains the *Mercury*, to the height of 28½ inches, is not the weight of the Incumbent *Air;* which indeed is taken off by the Bell in the *first* Experiment, and by the Cement in the *second*, but is in reality an effect of Compression, which was produced and wrought in the *Air* (contained in B C D *Fig.* 1 and in A H *Fig.* 2) by that weight before they were Cemented close: whence 'tis no wonder, that the *Quicksilver* subsides not from its usual height, the *Air* keeping in the same state of Compression as 'tis forced to do, from the resistance made by the glass Bell, and Cement, which supplies the place of all that vast Tract of Incumbent *Air*.

And because 'tis yet believed by some, that the force of a supposed *Spring* in the *Air* acts wholly in this Effect, so as without it by no means it could happen; 'twas therefore attempted to insinuate the contrary, by the following Experiment.

Taking the same Vessel A B, with its Cane E F (before we poured off any of the *Mercury*, as was directed in the former Experiment, or stopt up the Mouth of the Vessel at A with Cement) and then setting all in a great Vessel full of *Water* K L M N, the *Quick-silver* was observed to be sensibly deprest from A to G H; and on the contrary, raised in the Cane from I to O; this Ascent being about the *fourteenth* part of the whole height of the (*Turn to next page*)

Astronomer Forecasts English Rains

Meteorology

Storms which hampered the early days of the Boy Scouts' jamboree in England are but a forecast of a return to normal rainfall for the second half of 1929, after an exceedingly dry six months, according to predictions of Dr. Dinsmore Alter, professor of astronomy at the University of Kansas.

A test prediction by Dr. Alter, published in the U. S. Monthly Weather Review for June, 1927, forecast the dry season through which the British Isles have just passed. If the observed rainfall follows the prediction for the next six months as closely as it has in the past several years, England may look for approximately normal rainfall the rest of the year. After a damp spring in 1930, the prediction indicates, England may experience two years of sub-normal rainfall.

Dr. Alter has published a dozen papers on periodicity of rainfall, basing his studies on records from many sections of the world. The British Isles and the Pacific Coast of North America, with their purely marine types of weather, and the purely continental types as found in the Punjab of India, and in Siberia, gave the most consistent results when mathematical formulae were applied.

The British Isles predictions, for example, were based on a study of data from six different places in the Isles, covering the years from 1834 to 1924. From these data, a periodogram was computed with a dozen or more peaks, the four principal of which were applied in producing the chart published in the United States two years ago, and making test predictions up to 1940.

Actual reports received since the test prediction was published have been charted, and found to have a high correlation. The predicted excess of rainfall by 12 per cent., in the spring of 1926, was found actually to be 18 per cent. excess of normal. The predicted excess of 3 per cent. in the fall of 1923 became an actual 4 per cent. deficiency, but the predicted excess rainfall for the latter part of 1927 and all of 1928 was even exceeded by the actual figures. Reports received by Dr. Alter for the first three months of 1929 showed even less rainfall than the 22 per cent. he had predicted. The prediction is "practically normal" for the second half of this year.

Dr. Alter leaves for Europe the latter part of August to spend a year under a fellowship granted by the Guggenheim Foundation. He expects to spend the greater part of his time in England and Scotland, examining rainfall records, many of which are only in manuscript form, in a hope to discover further data that will make his predictions more accurate.

He disclaims all hope of being able to predict long in advance the weather probabilities for any particular day, but he does believe there are possibilities in predicting in larger units the possible weather, especially as to rainfall. Such predictions, if reasonably accurate, he believes, would be of great benefit to agriculture.

Science News-Letter, August 17, 1929

Torricelli's Vacuum—*Continued*

Water E F: then the Mouth A was closed, that so onely the *Water* in the space A G H might press upon the *Mercury*, which nevertheless lost none of the height lately gained by the weight of all the Incumbent *Water* E F, above the First Level I; yet in this case the included *Water* A G H, not by vertue of any Springs (which perchance it had not) but because it had been forced by the Charge of the whole height E F into the space left by the *Quick-silver* rising from I to O, and kept there by the same force, and so hindered from Returning. The same may be said to happen to the *Air*.

Lastly, Some desirous to see what Effect a greater, or lesser Rarefaction of the *Air* included in A G H would have, made this Trial.

Joyning to the Vessel A B the Beak C D (into which they fastned a Mouth of Metal with a *female Screw*), they adapted a *Syringe;* Then whenever a *Suction* was made of the *Air* in A G H, and so what remained attenuated and weakened, the Level I, might be seen to *subside*, contrarily when compressed more, by forcing in new *Air;* the same Level I *was raised*.

The same happens from *Fire* or *Ice* approaching it; for the Mouth C being closed, when *Fire* is Externally applyed to the Air in A G H, the *Mercury* rises, and by the application of *Ice subsides;* as if after the same manner, as it happened in the contrary operations of the *Syringe;* the *Air* had been Condensed, and enforced by Heat, and rarefied and weakened by Cold; from all which Matters it seemed probable, that this *sustention* of the *Fluid* does not absolutely depend upon the *weight* of the *Air*, but also upon the *compression* which *lower* parts of the *Air* receive from those above.

Evangelista Torricelli (1608-1647) was born at Faenza, Italy. At the age of 19 he was sent to Rome to study science. His work was chiefly in mathematics and mechanics. His development of the theory of some of Galileo's experiments led his teacher, Castelli, to send him to Galileo, and Torricelli served as amanuensis to the blind Galileo for the last three months of the older man's life. But Torricelli himself lived only six years longer. The famous experiment of creating a vacuum above the column of mercury supported by air pressure was first made in 1643.

The Academie del Cimento was a group of Italian scientists, pupils and followers of Galileo and of Torricelli, who banded together for the purpose of making experiments supplementary to those of their masters. They rigidly excluded philosophical interpretation and explanation, and sought only experimental truth. They published their researches only in the name of their society.

Science News-Letter, August 17, 1929

Breathe Exhaust Fumes

Physiology

The U. S. Bureau of Mines, in cooperation with the bridge and tunnel commissions of New Jersey and New York, has recently conducted an experiment to discover whether persons exposed for long periods of time to the exhaust fumes in the Holland Vehicular Tunnel would become ill.

Six men volunteered to breathe the fumes for from four to seven hours each day over a period of 68 days. The gas mixture used in the experiment contained 2, 3, and 4 parts of carbon monoxide to 10,000 parts of air. Some of the men had frontal headaches after breathing the mildest mixture for 3½ hours and after an exposure of only 1½ hours to the strongest mixture. After four hours of exposure to the 4-part mixture the blood had absorbed the gas to an extent of 30 per cent. No serious effects were noted in the short time that it would take to drive through the tunnel.

Science News-Letter, August 17, 1929

Umbrellas are considered signs of dignity and authority among natives of the Gold Coast in West Africa.

Chinese tung oil, which has many uses, is now the fourth largest chemical import of the United States.

Geographic Congress at Mexico City

Geography

The Mexican government is calling together all American countries to an international geographical congress to be opened in Mexico City on September 16 of this year.

One of the results of the sixth Pan-American Conference held at Havana in February, 1928, was the resolution to establish an inter-American institute of geographical sciences. The general outlines of such an institution, as formulated by the Mexican delegates to the Havana Conference, were adopted as the basis of the preliminary organization, and Mexico City was chosen as its permanent seat.

The government of the country elected as the permanent seat is obliged to house the new scientific institution, and for this purpose the Mexican government is providing the building which is now the Direction of Geographical and Climatological Studies of the Mexican Department of Agriculture. The building is in the historical suburb of Tacubaya, on a hill overlooking Mexico City from the west, and it overlooks from its balconies the beautiful gardens of the National Astronomical Observatory.

Pedro C. Sanchez, chief of the Direction of Geographical and Climatological Studies, is directly in charge of the organization of the new bureau which will be officially known as the Pan-American Institute of Geography and History. The building is now being remodeled under the direction of Senor Sanchez. The modern printing and map-making establishment under his charge will be at the disposal of the new institute, he says.

The aim of this new inter-American scientific organization is the coordination, distribution, and popularization of geographical knowledge of the Americas, and the fomentation of better mutual understanding. It will serve as a bond between the geographical institutes already existing in various countries of the American continent and will initiate and facilitate cooperative research in geographical sciences. It will publish the work of member-countries and intervene in the delineation of boundaries. It will form archives and a library containing maps, documents and books relative to the geography of American countries.

The purpose of the September meeting is to complete the organization of the institution, to select its governing personnel, to fix the quotas each country must pay, and to determine the date of its first technical meeting. The meeting will be opened by Marte Gomez, Mexican Minister of Agriculture, and Senor Sanchez will preside at the business sessions. Because the permanent home of the organization in Tacubaya will not be ready, the meetings will be held in the Pan-American sala of the National Palace at Mexico City. The congress will be officially dissolved at Chapultepec Castle by President Portes Gil.

Science News-Letter, August 17, 1929

Clearing Insane Minds

Psychiatry

Inhaling carbon dioxide gas temporarily restored the sanity of mentally deranged patients at the University of California Medical School.

The experiments were conducted at the request of Dr. A. S. Loevenhart and Dr. Ralph M. Waters of Madison, Wisconsin, the former of whom has since died. The tests were made by Dr. Chauncey D. Leake and Dr. Mary E. Botsford, of the University, with the help of Dr. Arthur E. Guedel, of Beverly Hills, and some six other physicians.

Eight trials of the treatment were made on five cases of the type of insanity known as dementia praecox catatonia. In all but one trial there was a fleeting return of intelligence which enabled the patients to answer questions rationally, or to exhibit recognition of their surroundings. These periods of rationality lasted from ten to fifteen minutes.

In the case of a young man 25 years of age, who has lain in bed in a stupor for several months, inhalation of the gas clarified his mind sufficiently to answer a number of questions, to volunteer a few rational statements concerning himself, and to laugh. After about nine minutes he relapsed into his former state of muscular rigidity, paleness and fright.

In a report of their findings, the experimenters state that the results are interesting enough to warrant further experimentation on the effects of continued treatments with carbon dioxide in such cases.

Science News-Letter, August 17, 1929

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Strange Behavior of Insane Has Meaning

Psychiatry

By WILLIAM A. WHITE
Superintendent, St. Elizabeth's Hospital
Washington, D. C.

At the beginning of the present century psychiatry was the most backward of medical specialties. Its status at that time was described figuratively by calling it the "Cinderella of Medicine". It was in the static, descriptive stage of development. Most of its patients were confined as a result of "due process of law" in public institutions, and its votaries were engaged in elaborating classifications on the one hand and looking under the microscope at brain sections for an explanation of their patients on the other. It was the period of "brain mythology".

At the beginning of the present century psychoanalysis made its appearance, and the individual patient for the first time became a human being with wishes and motives back of and explaining his conduct. Delusions and incoherence were no longer meaningless. They had a meaning even if it could not be found, and an attempt was made to discover it. From being static, psychiatry changed to being dynamic, from being descriptive it changed to being interpretive, and from being statistical it recognized that each patient presented an exquisitely individual problem.

These various changes could all be described by saying that in the bizarre and alien symptomatology of the patient "meaning" for the first time was discovered.

As soon as the meaning of the symptoms came to be intensively and conscientiously studied, it was discovered that these meanings were for the most part quite as hidden from the patient himself as from the observer; in fact, ofttimes more thoroughly, so that it became obvious that the motives for conduct were largely unconscious. This means that the psychic life is not all consummated within the field of conscious awareness, but as Stanley Hall used to say, conscious awareness is only a small part of the mind comparable to that portion of an iceberg which is visible above the surface of the water, a much larger portion being submerged, which corresponds to the larger portion of the psychic life which goes on unconsciously. This concept of the unconscious which psychoanalysis brought to psychiatry is perhaps the most notable single contribution to the understanding of mental illness during the present century. It is now generally recognized that the majority of our motives are unconscious and that, at least for all practical purposes of inquiry, determinism rules as definitely in the psychological sphere as it does elsewhere. In addition to this change the emphasis has shifted from the so-called "intellectual" aspects of the psychic life to the emotions. It is the emotions rather than the intelligence that furnish the motives back of conduct and it is in this field that the psychiatrist has come to find his most significant problems. These concepts have changed the entire approach to the problem of the individual psychotic patient and made him at once an object of inquiry and interest.

From being the "Cinderella of Medicine" psychiatry in the last quarter century has come to occupy a place on all fours with other medical specialties, which means that it has covered as much ground during twenty-five years as they have during several hundred. It has definitely entered the field of preventive medicine, where it is doing excellent work. Its affiliation with general medicine has not been easy because it deals with the elusive mind, the manifestations of which are intangible, imponderable and invisible. Nevertheless, it has gradually become as objective as are the other medical specialties.

The advance in psychiatry which has taken place in these few years has been paralleled by a similar advance in biological conceptions, both based upon the concept of the organism-as-a-whole; and it has been realized as a result of thinking of the organism in this way that its psychological aspects represent only one way of looking at it, that a human being may be studied from the chemical point of view or the physiological point of view or the psychological point of view, for the purpose of convenience, if you will, but that what one finds as a result of such studies by no means indicates the absence of what would be found if one studied the individual from the other points of view. So that it has come to be realized that mind and body are only different aspects of the individual and that at least for the purpose of medicine, and of psychiatry in particular, the distinction between them, as Professor Meyer often emphasizes, is of no practical significance.

In recent years, therefore, we have seen grow up a large number of elaborate researches among the mentally ill to determine the relation of the illness to the bodily state, so we see types of mental illness correlated with types of physique. We see certain mental diseases studied from the standpoint of metabolism, blood chemistry, reaction to toxemias and infections, changes in the blood picture, responses to the galvanometer, the relation to the endocrine glands, variations in the blood sugar curve, and many other things. More recently this field of investigation has been particularly stimulated as a result of the very numerous cases of encephalitis lethargica, known as sleeping sickness, which present such complex patterns of both bodily and mental symptoms. The tools of general medicine and the concepts of general medicine are being used in psychiatry so far as they are applicable, and vice versa. We begin to see the general medical man paying more and more attention to the psychology of his patients, until now we find him recognizing conditions as of emotional origin which but a few years ago he would have been entirely at a loss to explain because he could not find a physical basis for them. Thus general medicine and psychiatry are coming closer and closer together and thinking more nearly alike.

With the biological concept of the organism-as-a-whole, the way of looking at the human being had necessarily to change. He could no longer be considered as the sum total of the organs which compose him, and mind could no longer be thought of as an effect of physical processes. Mind behavior was only one aspect of a total functioning organism of which each organ represented an integrated part. With this concept as a beginning, it is only necessary to think beyond the span of the individual's life into his past to realize that the present-day status of any individual, be it anatomical, physiological or psychological, like any physical event, can only be thoroughly understood by interrogating its past.

Human beings have, therefore, come to be studied in this way, and it has been realized as a result that the living organism has always had types of reaction which were as properly called psy- (*Turn to next page*)

Unknown Empire Under American Flag

Geography

Not all of the unexplored places of the earth lie in far-away places under foreign flags, according to Stephen R. Capps, acting chief Alaskan geologist of the United States Geological Survey. Up in Alaska, under the Stars and Stripes, is a vast area of many thousands of square miles which is practically unexplored. One of the largest of these unexplored areas is the region that lies between the Skwentna River on the north and Lake Clark on the south, and between the west front of the Alaska Range and Cook Inlet. This region, in the south central portion of the Territory above the Alaska Peninsula, is entirely occupied by rugged, glaciated mountains except for a narrow strip of low, marshy land between Cook Inlet and the mountains.

A portion of this hitherto unknown territory has been invaded by geologists and topographic engineers of the Geological Survey under considerable difficulties, and as a result of their labors during one season an area of about 1,200 miles was mapped geologically and topographically on the scale of 1:180,000. Of this area 900 square miles, mostly in the headwaters of the Skwentna River, was country that previously was entirely unexplored.

In such new, unknown country, where streams are too swift for ordinary boating and the only trails are those made by the native animals, the map-maker and geologist must still use the primitive methods of transportation, including the pack horse and the boat dragged by hand through swift currents. In one locality visited by a Survey party no human being was seen for a period of over two months, and even the signs of native camps indicated that they were twenty to thirty years old.

In this country, so little visited by man, either white or native, the animal life is almost undisturbed. Over a hundred black and grizzly bears were seen one summer by the surveyors.

Science News-Letter, August 17, 1929

Strange Behavior of Insane Has Meaning—*Continued*

chological as were certain other of its types of reaction called physiological. The psychological aspect, therefore, of the human being is as much a product of the past as his anatomical and physiological aspects, and its history is as long. In this way we envisage the individual as coming into the world with certain functions prepared for so thoroughly that the necessary structures for carrying them into effect are already laid down. Speaking generally, these are the instincts, and it is with instinctual equipment that the individual faces the world to which he has to adapt.

Just as we had a period of "brain mythology" when delusions, so to speak, were hunted for under the microscope, so we have had a period of cerebral localization in which every function of the organism was supposed to be located in some particular spot in the brain. Our new concept realizes that this can only be true with certain qualifications and that every behavioristic reaction is a reaction of the organism-as-a-whole, which, to be sure, is brought to pass by virtue of certain structures and through certain structural pathways. And so, while we have come to realize that there are certain very definite tendencies which are pretty clearly defined by equally definite structures, we have also come to realize that there is a large field of adaptation in which the whole situation is very fluid and therefore modifiable.

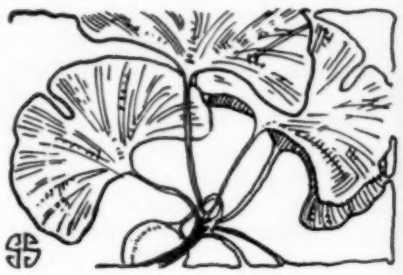
Just as a man is born into the world with certain structures and tendencies already well defined, he comes into surroundings with already existing institutions and traditions to which he has to adjust if he wishes to be a part of the social group. Psychiatry is primarily interested in the individual contribution to this cultural background. The social sciences are the sciences that are interested in the background itself.

Psychiatry should be known not alone by what it has accomplished but by its tendencies. It does not pretend to have the answer to all questions in the various fields in which it believes it has an important contribution to make, but it does believe that it knows in which direction to search for light. Professor Freud made the significant remark in his article on Psychoanalysis in the Encyclopædia Britannica that the future will probably attribute far greater importance to psychoanalysis as the science of the unconscious than as a therapeutic procedure. While this is true of psychoanalysis, psychiatry will always remain that department of medicine which deals with the nature and the treatment of mental disease.

Science News-Letter, August 17, 1929

Nature Ramblings

By Frank Thone



Ginkgo

Visitors to Washington, D. C., are always much impressed with the beauty of the avenues of ginkgo trees that line the approaches to the Department of Agriculture buildings, and that ornament the city in many other places. There are two splendid specimens of this tree behind the statue of Daniel Webster at Scott Circle, that are worth a special side-trip to see, especially in early autumn, when their leaves turn yellow.

There is no good reason why Washington should be the only city in the country especially favored with this famous tree, sacred to the Chinese and Japanese, and grown for centuries in their temple courts. It does very well in all parts of the United States where the winters are not too severe, and can at least survive as far northwest as central Iowa.

It can also stand a good deal of city smoke and dust. There are a lot of young ginkgos growing in Battery Park, New York City; though to tell the truth they do not look so happy as the Washington specimens. One of the good botanical jokes of the season came off when a little ginkgo tree was solemnly presented to Mayor "Jimmy" Walker as a great rarity from the East, and as solemnly planted by him in front of the City Hall, when within a stone's throw—or at least a Babe Ruth home-run slug—there were dozens of them that had been growing for several years.

China is the native home of the ginkgo tree, though it has been much disputed of late whether there are any more really wild trees left in that country; the species has been cultivated so long. But there are fossil ginkgo leaves and twigs in American rocks, proving that the present importations are not a *premiére*, but a return engagement, for this handsome tree.

Science News-Letter, August 17, 1929

FIRST GLANCES AT NEW BOOKS

1001 CELESTIAL WONDERS—Charles Edward Barns—*Pacific Science Press* ($2.50). When Mr. Barns published the first edition of this book in 1927, it was received with well-deserved acclaim by the astronomical world, both amateur and professional. So pupular was it, in fact, that the edition was soon exhausted. Now the author has found time to print another, for a unique feature of it is that Mr. Barns not only wrote it, but personally printed it as well. As it stands, it is a testimony to his ability as an astronomer, as an author and as a printer. Like the first edition, it contains a set of seventy-two star charts showing the principal telescopic objects in each, as well as all the naked-eye stars. The second part of the book contains full detailed instructions for making reflecting and refracting telescopes. All this is supplemented by a fine group of astronomical photographs, accounts of the members of the solar system, important astronomical objects and the late researches. It is a *sine qua non* for the library of every amateur astronomer.

Astronomy
Science News-Letter, August 17, 1929

STUDIES OF MEAN SEA-LEVEL—Report of Committee on Shoreline Investigations by Douglas Johnson, Bulletin 70—*National Research Council* (50c). That the general sea-level is not rising nor the land subsiding is the conclusion of the studies reported in this bulletin.

Oceanography
Science News-Letter, August 17, 1929

MUSHROOMS OF FIELD AND WOOD—Margaret McKenny—*John Day* ($2). A few years ago there were almost no books on the fleshy fungi that could be recommended for the beginning student or the general wood-wandering public; now there are many. In spite of this competition, however, Miss McKenny's book will certainly make a place for itself, for it is carefully and scientifically gotten up, yet so simply and clearly written that not even the most simple wayfarer need err therein.

Mycology
Science News-Letter, August 17, 1929

FRENCH IDIOM LIST—Frederic D. Cheydleur—*Macmillan* (75c). Idiom is the heart of language; even the occasional user of French will be interested in the frequency of occurrence of the various expressions listed and analyzed in this book.

Language
Science News-Letter, August 17, 1929

REPORTS OF THE CONFERENCES ON CYCLES—*Carnegie Inst.* (Gratis). In 1922, Dr. J. C. Merriam, president of the Carnegie Institution, called a conference of leading research workers on the problems of cycles of all kinds — weather, sunspot, economic, etc. Last December a second conference was called. This volume contains the reports of both. It includes papers by Dr. D. T. MacDougal, on "Trees as Recorders"; by Dr. A. E. Douglass, on "Cycles in Tree Growth"; by Dr. W. C. White, on "Relation of Certain Diseases to Cycles in Nature"; by Dr. C. G. Abbot, on "Variations in Solar Radiation"; by Dr. Ellsworth Huntington, on "Cycles of Health" and on "Causes of Cycles"; and by Dr. H. L. Moore, on "Economic Cycles."

General Science
Science News-Letter, August 17, 1929

THE EXPORT DEBENTURE PLAN FOR WHEAT—*Stanford University Food Research Institute.* In this study ot the export debenture plan offered to Congress and the country as one of the solutions of the farm problem, the experts of the Food Research Institute, which incidentally was organized largely through Mr. Hoover's interest, arrived at the conclusion that the export debenture plan would not provide the relief to agriculture that its proponents claim. The verdict of the experts in this case coincides in general with the Congressional verdict.

Economics
Science News-Letter, August 17, 1929

AIR COMMERCE BULLETIN, VOL. I, NO. 1—*Dept of Commerce, Aeronautics Branch*—This latest addition to the ranks of the Government printed bulletins was formerly issued in mimeographed form under the title of "Domestic Air News." It includes lists of United States air transport lines, together with a map, a review of aircraft radio research, and other interesting articles, as well as official statements of the Department.

Aviation
Science News-Letter, August 17, 1929

METALS AND ALLOYS: VOL. I, NO. 1—H. W. Gillett, Editor—*Chemcial Catalog* ($3 per year). The first issue of a new publication which deals with the industrial application of metals and combinations of metals.

Metalography
Science News-Letter, August 17, 1929

MODERN SCIENTIFIC KNOWLEDGE OF NATURE, MAN AND SOCIETY—Frederick A. Cleveland—*Ronald* ($4.50). To attempt to sum up the whole of modern scientific knowledge in 592 pages is such an ambitious project that one would think it foredoomed to failure. Yet that is what is done in this book, and, surprisingly enough, is very well done. Naturally, there are omissions of what some might consider essential, but on the whole, the book is a very good summary of the nature of the world of men and things around us. The staff of collaborators, including such distinguished names as Harlow Shapley, Horation Hackett Newman, Wayland F. Vaughan, Franklin H. Giddings, and others, indicates how this success was attained.

General Science
Science News-Letter, August 17, 1929

THE COAT OF ARMS, CREST AND GREAT SEAL OF THE U. S. A.—Leonard Wilson—*N. Francis Maw* ($1.25). An illustrated account of the history and meaning of the arms, crest and seal of this country. Mr. Wilson's book should be especially interesting to the young student of American history.

Heraldry
Science News-Letter, August 17, 1929

EXPERIMENTS IN GENERAL PSYCHOLOGY—Norma V. Scheidemann—*Univ. of Chicago Press* ($1). A notebook manual which directs students as to how to make a series of simple experiments and observations which link with the facts presented in the usual first year psychology text. The author aims, not merely to aid the student in fixing the book principles in mind more firmly, but she believes that such exercises will develop in the student a "greater interest in the study of mental life."

Psychology
Science News-Letter, August 17, 1929

BLUEPRINT READING—J. Ralph Dalzell, James McKinney and Herman Ritow—*American Technical Society* ($1.25). A handbook for carpenters, builders and architects.

Engineering
Science News-Letter, August 17, 1929

MOLECULAR PHYSICS IN RELATION TO BIOLOGY—Subcommittee on Molecular Physics — *National Research Council* ($3). A monumental symposium discussing that increasingly important scientific borderland where molecular physics and biology meet.

Biology—Physics
Science News-Letter, August 17, 1929

The Uses of Theorizing

Physics

W. F. G. SWANN, in *The Journal of the Franklin Institute* (August, 1929).

We sometimes hear the question asked, "What is the use of theorizing in physics—in trying to find out how nature works? Let us get down to something practical, something which will show immediate results." The complete answer to this question would take a lot of time, but I may perhaps say that there are two types of discovery, one in which somebody discovers by accident or otherwise, some new phenomena, or substance, which over night revolutionizes some process or branch of science. Then there is the other type of discovery whose significance I can perhaps symbolize in this way.

Suppose that I should go into a new country, with whose laws I were unfamiliar. I should proceed to violate the traffic regulations and get locked up. I should seek to buy a house, and should make many mistakes, and finally muddle my way to a completion of the transaction. I should seek to raise a loan and should encounter many embarrassing and time-wasting considerations. And then, perchance, I should sit down and say to myself, "It is about time that I found out what the laws of this country are." Suppose that the situation were such that I could not inquire as to this matter from the local authorities, but were compelled to find it out for myself. On the basis of my experience of being arrested for speeding, and of buying a house, and of a dozen other things, I might formulate some system of laws for that country which would correlate those things which had happened to me. These laws would then suggest other things which might be true—they might suggest that prohibition would be likely to exist in this country, or that smoking were prohibited, or possibly required; and if the theory I had formulated were a good one, it would not lead me into error in these speculations. There is a very good chance that if I had pinned it down to known facts at the places where I knew those facts, it would be faithful and tell me no false story at other places where I asked information of it. Now, on the basis of the more complete knowledge of the laws of this country thus obtained, I should be in a very much better position to make use of them and develop the resources available to me as a result of this more complete sensitivity to the way in which things happened. There would, in the course of five, ten or fifteen years, arise railroads in that country, there would arise telephones, there would arise huge factories, and various other things, so that in comparison with the situation which existed at the beginning of that time, we might in all verity say that a miracle had happened; and yet these things would have arisen in such manner that there was no particular occasion on which anyone would go to bed at night, and arise on the following morning to find things appreciably different from what they were the night before. It is in some such sense that a great generalization in mathematical physics can serve a practical use in the realms of science.

Science News-Letter, August 17, 1929

Lady Hecate

Natural History

BARBARA HASTINGS, in *Grand Canyon Nature Notes.*

Lady Hecate was my pet for several days at Phantom Ranch during May. She was one of the small red bats—*Myotis californicus*—which can be seen in great numbers circling and swooping in Bright Angel Canyon just at dusk.

As I was walking along one of the trails before dark I noticed that there were several bats flying low over the dust to catch any insects which might be there. I found a large, soft switch and soon brought one of them to the ground, stunned. Just as it was reviving I picked it up. Viciously she bit and clawed me, but her teeth were too small to puncture my skin. And how she did squeak and chatter! She was in a perfect frenzy to get away. I put her in my handkerchief, however, and brought her to my cabin where I liberated her.

Very peevishly she fluttered around, swooping back and forth, miraculously avoiding walls and furniture. Finally she stopped on one of the screens and began to crawl nimbly across it. Thinking she might be thirsty I caught her very gently in a handkerchief to give her a drink. She was "madder than hops" and bit the cloth time and again. She did condescend to take a drop of water from the tip of my finger, but was too provoked at her predicament to be grateful for it.

Then I caught several moths for her to eat. At first she did not understand that they were for her, but I shoved one into her mouth when she was preparing to bite me and she gobbled it down. After that she did not hesitate when I offered her millers but jerked them out of my fingers and made short work of them.

I kept Lady Hecate for two days. By the third night she had become so tame that I could not go in my cabin that she did not light on my sleeves or shoulder and crawl to my hand to be fed. She drank drops of water from my finger tips and then licked my fingers. I fed her at least six large millers the third night. She would hang calmly upside down on the screen and chew them. I could hear her little teeth cracking. Generally she was most fastidious and was careful not to eat the wings of the moth. They would flutter to the floor after the last chew.

Six millers did not satisfy her hunger, however, and she seemed to be insistent for more. She really became quite a nuisance, begging for food every time I went in the cabin. I had exhausted the supply of millers from two cabins and could not find any more, so finally I decided she would have to feed herself. I hated to let her go because in that short time she had become so friendly and trusting.

As I stood there deciding to liberate her she flew up and clung to my sleeve. Then, very nimbly, she crawled to my hand. There she sat comfortably and looked up at me inquiringly with her bright, little, nearsighted eyes. Very quietly I walked across the porch, opened the screened door and stood in the path outside. Not realizing her freedom she continued to rest quietly in my hand. Then, slowly she crawled to my finger tips, hesitated a moment, and with a noiseless spread of her wings she was gone into the night, leaving me with a feeling that I had lost a friend.

Science News-Letter, August 17, 1929

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